

REMARKS

It is noted that, notwithstanding any claim amendments made herein, Applicant's intent is to encompass equivalents of all claim elements, even if amended herein or later during prosecution.

Claims 1-20 are all of the claims pending in the present Application. The Examiner has made a constructive election of claims 1-17 and has withdrawn claims 18-20 from consideration. Claims 1-7 and 10-17 stand rejected under 35 USC §103(a) as unpatentable over US Patent 5,576,867 to Baur et al. Claims 8 and 9 stand rejected under 35 USC §103(a) as unpatentable over Baur, further in view of Applicant's Admitted Prior Art. Claims 8 and 9 stand rejected under 35 USC §103(a) as unpatentable over Baur, further in view of US Patent 6,532,053.

Claims 1-7 and 10-17 stand rejected under 35 USC §103(a) as unpatentable over Baur, further in view of US Patent 6,266,116 to Ohta. Claims 8 and 9 stand rejected under 35 USC §103(a) as unpatentable over Baur, further in view of Ohta '116, and further in view of Applicant's Admitted Prior Art.

These rejections are respectfully traversed in view of the following discussion.

I. THE CLAIMED INVENTION

As described and claimed, for example, by claim 1, the present invention is directed to an active matrix type liquid crystal display device. A thin film transistor (TFT) substrate having a common wiring and a source/drain wiring is formed on a first substrate. The first substrate is provided with an insulating film covering the common wiring and the source/drain wiring. The insulating film is coated with a first alignment layer.

An opposite substrate, opposing the TFT substrate, having a second alignment layer, is formed on a second substrate. A liquid crystal is held between the first alignment layer and the second alignment layer. A common electrode and a pixel electrode is wired in parallel with each other and is formed as parts of the common wiring and the source/drain wiring,

respectively.

An angle made between a direction in which the first alignment layer is subjected to an aligning treatment and a direction in which the second alignment layer is subjected to an aligning treatment is set to a value of 0.5 to 4.0 degrees.

An advantage of the present invention compared to conventional techniques is that the initial alignments of the alignment layers are selected in a range of values (e.g., defined in each of the independent claims) that concurrently optimizes a number of characteristics, including switching response, threshold voltage, and luminance. As shown in Figure 7, the present invention provides measurable response time increases.

Moreover, as defined by various dependent claims (e.g., claim 2, etc.), by further narrowing the twist angle to 1.5 to 2.0 degrees, a contrast degradation of the liquid crystal can additionally be prevented.

II. THE CONSTRUCTIVE RESTRICTION

The Examiner has imposed a constructive restriction on claim 18-20 and withdrawn these claims from consideration. The Examiner originally took a position that the method described in claims 18-20 could be done in a different ordering of the steps described in the claims, and would, therefore be distinct.

Applicant has rendered the Examiner's rationale moot by amending claim 18 to eliminate the steps that the Examiner considers as the basis upon which to declare a different method. It is further pointed out that MPEP §803 states: "*If the search and examination of an entire application can be made without serious burden, the examiner must examine it on its merits, even though it includes claims to independent or distinct inventions.*" (Emphasis by Applicant)

Accordingly, Applicant requests that the Examiner reconsider and withdraw this restriction and constructive withdrawal.

III. THE PRIOR ART REJECTIONS

The Examiner alleges that Baur renders obvious the invention defined by claims 1-7 and 10-17 and, when combined with Applicant's Admitted Prior Art (AAPA) or Ohta '053, renders obvious the invention defined by claims 8 and 9. The Examiner considers that it would be obvious to one of ordinary skill in the art to optimize the twist angle $\beta \leq 15^\circ$.

The Examiner also alleges that Baur, when modified by Ohta '116, renders obvious the invention defined by claims 1-7 and 10-17, and, when further modified by AAPA or Ohta '053, renders obvious claims 8 and 9.

Applicant disagrees.

The present invention teaches that the twist angle can be used to concurrently tune the liquid crystal in a number of characteristics, including response time and threshold voltage. Therefore, the present invention teaches a precise, smaller range than suggested in Baur. Baur does not describe any dependence of response speed on twist angle.

The present invention describes twist angle to be a parameter for response time (e.g., see Figure 7). Baur does not mention response speed, let alone identify or recognize its dependence upon twist angle, and/or providing a solution for its improvement. Indeed, Baur does not even mention an effect for the twist angle. Hence, based on Baur, the dependence of response time on twist angle is an unexpected result, thereby establishing a criticality for this parameter and for the ranges discussed in the present invention.

As best understood, the rejection currently of record uses a generic description in the Abstract (e.g., "low dependence of image contrast on viewing angle") as justification to make narrower settings on twist angle.

Applicant submits that the problem with this rationale is that Baur makes no suggestion to optimize twist angle to achieve such generic description. That is, Applicant submits that one of ordinary skill in the art would not know, after reading Baur, which specific characteristic(s) to measure as twist angle is being varied, thereby not knowing how to optimize the setting for twist angle. Baur clearly teaches that this generic description is possible anywhere within the suggested twist angle range spanning 30 degrees (e.g., $0 \pm$

15°). It is noted that the twist angle range taught in the present invention is 0.5 to 4.0 degree for claim 1 and 1.5 to 2.0 degrees for claim 2, or about 1/10th and 1/60th, respectively, of the 30-degree range of Baur.

Given this difference in sizes of the ranges between Baur and the present invention, and without having identified a specific characteristic that is dependent upon twist angle, one of ordinary skill in the art would be much more likely to set twist angle outside the narrow range of the claimed invention as inside the range. That is, all that can be reasonably stated is that the present invention is possible from Baur but is not reasonably suggested, absent impermissible hindsight.

In contrast to Baur, Ohta '116 might reasonably be described as suggesting that twist angle be set to 0° +/- 5° (lines 32-34 of column 4) for at least one specific reason. That is, at lines 58-62 of column 18, Ohta states: "*However, a twist angle within 5 degrees of zero degrees, or $|\phi_{LC-b} - \phi_{LC-t}| \leq 5^\circ$, is also applied to each embodiment of this invention in order to shift a driving voltage range to a more suitable range, or to improve contrast of a[n] image in a fixed driving [voltage] range.*"

However, the Examiner also points to lines 33-37 of column 19, which states: "*The embodiment of the present invention makes it possible to decrease a driving voltage and increase a response speed by arranging the driving (reorientation) directions of liquid crystal molecules to a single reorientation direction in the liquid crystal driving region.*" (Emphasis Applicant')

Applicant submits that this second passage does not reasonably relate to twist angle in isolation, as understood to be implied in the rejection currently of record. Rather this description refers to the tilt angle θ of the electrodes and the initial orientation angle 90- θ described in the preceeding paragraphs (e.g., at lines 18-32 of column 19). It is also noted that this initial orientation would contradict the requirement of the additional limitation of claim 3 of the present invention.

Therefore, Applicant submits that only Ohta '116 can reasonably be said to make any suggestion concerning the awareness in the art that twist angle can be used to tune

characteristics of the LCD of the type discussed in the present invention and that only the description at lines 32-34 of column 4 can be used by the Examiner as an objective articulation of the utility of twist angle as a tuning parameter for purpose of the prior art evaluation.

Even assuming this to be true, Applicant submits that the very brief description at lines 32-34 of column 4 of Ohta '116 would not provide a basis sufficient to meet the Examiner's initial burden of proof.

That is, Ohta teaches, at most, a 10-degree range (e.g., $0^{\circ} \pm 5^{\circ}$) for twist angle "*... to shift a driving voltage range to a more suitable range, or to improve contrast of a[n] image in a fixed driving [voltage] range.*"

In contrast, the present invention teaches a range for twist angle between 0.5 to 4.0 degrees (e.g., 3.5 degrees) for purpose of providing multiple benefits of: decreasing the threshold voltage between the pixel electrode and the common electrode, increasing the switching response, and increasing luminance (e.g., see Figures 6 and 7).

If the range is further reduced to be 1.5 to 2.0 degrees (e.g., a range of 0.5 degrees), a fourth benefit can be realized (e.g., preventing a contrast degradation, in accordance with Figure 8).

Applicant submits that Ohta '116 makes no suggestion whatsoever to further limit its suggested ten-degree range down to concurrently provide several advantageous characteristics, let alone the benefits identified in the independent claims.

Therefore, similar to the argument for Baur, Applicant submits that, absent impermissible hindsight, one of ordinary skill in the art would not have been motivated to further refine twist angle from that taught in either Baur or Ohta simply because there is no characteristics for which the twist angle settings can be compared so that the final setting would be within the claimed ranges (e.g., 0.5 to 4 degrees and 1.5 to 2.0 degrees).

As Applicant previously pointed out, the appropriate legal standard appropriate to the analysis of the present Application is defined in MPEP §2144.05 II. B. in which section it is described that each "*... particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the*

optimum or workable ranges of said variables might be characterized as routine experimentation (emphasis by Applicant)." This section is citing *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA, 1977).

It is further noted that, as clearly described in MPEP §2143.02: "[A] patentable invention may lie in the discovery of the source of a problem even though the remedy may be obvious once the source of the problem is identified. This is part of the 'subject matter as a whole' which should always be considered in determining the obviousness of an invention under 35 U.S.C. §103."

Discovery of the unexpected results shown in Figures 6, 7, and 8, that demonstrate the effectiveness of the present invention's narrow range(s) of twist angle, is the result of the present inventor's originality. These results are not reasonably suggested in either Baur or Ohta '116.

The following words from the above-cited Antonie case are an appropriate criticism of the technique of the rejection currently of record, as follows (emphasis by Applicant):

"In determining whether the invention as a [whole] would have been obvious under 35 U.S.C. §103, we must first delineate the invention as a whole.... Just as we look to a chemical and its properties when we examine the obviousness of a composition of matter claim, it is this invention as a whole, and not some part of it, which must be obvious under 35 U.S.C. §103.... The PTO and the minority appear to argue that it would always be obvious for one of ordinary skill in the art to try varying every parameter of a system in order to optimize the effectiveness of the system even if there is no evidence in the record that the prior art recognized that particular parameter affected the result. As we have said many times, obvious to try is not the standard of 35 U.S.C. §103.... Disregard for the unobviousness of the results of 'obvious to try' experiments disregards the 'invention as a whole' concept of § 103,.... and over-emphasis on the routine nature of the data gathering required to arrive at appellant's discovery, after its existence become[s] expected, overlooks the last sentence of §103. "

Therefore, Applicant submits that the discovery of using twist angle as a tuning parameter for the various characteristics listed in the claims is sufficient ground for novelty.

The Examiner relies upon the Applicant's Admitted Prior Art and Ohta '053 as demonstrating details defined in claims 8 and 9 for the thin film transistor construction, which reliance does not overcome the failure in Baur or Ohta '116 to define twist angle as a

parameter for a multiple-benefit result.

Hence, turning to the clear language of the claims, there is no teaching or suggestion of “...so that an angle made between a direction in which said first alignment layer is subjected to aligning treatment and a direction in which said second alignment layer is subjected to aligning treatment is set to a value of 0.5 to 4.0 degrees, said value providing a setting that concurrently decreases a threshold voltage between the pixel electrode and the common electrode required to change a direction of said liquid crystal therebetween, increases a response of switching of said liquid crystal, and increases a luminance of said liquid crystal.”

Moreover, for purpose of appeal, Applicant notes that the rejection currently of record fails to provide proper motivation to modify Baur to incorporate the thin film transistor details of claims 8 and 9. That is, as described in MPEP §2143.01: *"The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art itself also suggests the desirability of the combination"* (Emphasis in MPEP itself).

For the reasons stated above, the claimed invention is fully patentable over the cited references.

Finally, for purpose of Appeal, it is further submitted that none of the references teaches or suggests the plain meaning of the language for claims 2, 4, 5, 10-12, 18, and 19.

Further, the other prior art of record has been reviewed, but it too even in combination with Baur, Ohta '053, Ohta '116, or Applicant's Admitted Prior Art, fails to teach or suggest the claimed invention.

IV. FORMAL MATTERS AND CONCLUSION

In view of the foregoing, Applicant submits that claims 1-20, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed

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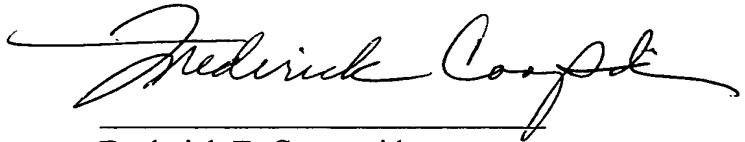
below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

Date:

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